Having described the invention, the following is claimed:

1. A system for classifying an input image into one of a plurality of output classes, said system comprising:

a plurality of pattern recognition classifiers, each of the plurality of pattern recognition classifiers determining a candidate output class and at least one rejected output class for the input image from an associated subset of the plurality of output classes and generating a confidence value associated with the classifier based on the determination; and

an arbitrator that selects a classifier having the best associated confidence value and eliminates the at least one rejected class determined at the selected classifier from consideration as the associated class for the input image.

2. The system of claim 1 wherein the arbitrator iteratively defines a subset of classifiers associated with the candidate output class from the selected classifier, selects a new classifier having the best associated confidence value within the defined subset, and eliminates the at least one rejected classes determined at the selected new classifier from consideration as the associated class for the input image until only one output class remains.

3. The system of claim 1, wherein the subset of output classes associated with each classifier comprises two classes, such that each classifier determines one candidate class and one rejected class.

4. The system of claim 1 wherein at least one of the plurality of pattern recognition classifiers includes a support vector machine.

5. The system of claim 1 wherein at least one of the plurality of pattern recognition classifiers includes an artificial neural network.

6. The system of claim 1 further comprising an image source that provides the input image.

7. The system of claim 6 wherein the image source is operative to provide the input image as a three-dimensional image.

8. The system of claim 7 wherein the image source includes a stereo camera.

9. The system of claim 6, wherein the image source is operative to provide the input image as a two-dimensional image.

10. The system of claim 1 further comprising an image preprocessor that removes background information and noise from the input image.

11. The system of claim 10, the image preprocessor applying a contrast limited adaptive histogram equalization that adjusts the input image for lighting conditions.

12. A system for classifying image data associated with a vehicle occupant safety system into an associated one of a plurality of output classes, said system comprising:

a vision system that images a vehicle interior to provide an input image;

a plurality of pattern recognition classifiers, each of the plurality of pattern recognition classifiers having associated first and second output classes from the plurality of output classes and being operative to select one of the first and second output classes as a candidate output class for the input image and the other of the first and second output classes as a rejected output class and generate a confidence value associated with the classifier based on the selection;

an arbitrator that selects a classifier having the best associated confidence value from a classifier set initially comprising the plurality of classifiers, determines the rejected class associated with the selected classifier, and removes each classifier within the classifier set

having the rejected class as one of its associated first and second output classes.

13. The system of claim 12 wherein the arbitrator iteratively defines a selection set of classifiers associated with the candidate output class determined by the selected classifier, selects a new classifier having the best associated confidence value within the selection set, determines the rejected class associated with the selected new classifier, and eliminates each classifier within the classifier set having the rejected class as one of its associated first and second output classes until only one classifier remains in the classifier set.

14. The system of claim 13, wherein the candidate class determined by the one remaining classifier is accepted as the output class associated with the input image, and the accepted class is provided as an input to the vehicle occupant safety system.

15. The system of claim 12 wherein at least one of the plurality of output classes represents a human adult seated within the vehicle interior.

16. The system of claim 12 wherein at least one of the plurality of output classes represents a rearward facing infant seat positioned within the vehicle interior.

17. The system of claim 12 wherein at least one of the plurality of output classes represents a human head.

18. The system of claim 12 wherein the vision system is operative to produce a two-dimensional image of the vehicle interior.

19. The system of claim 12 wherein the vision system is operative to produce a three-dimensional image of the vehicle interior.

20. The system of claim 19 wherein the vision system comprises a stereo camera that images the vehicle interior as a stereo disparity map.

21. A method for classifying an input image into an associated one of a plurality of output classes comprising the steps of:

determining a candidate output class, at least one rejected output class, and an associated confidence value from a set of associated output classes at each of a plurality of classifiers;

selecting a classifier from the plurality of classifiers having a best confidence value; and

eliminating the at least one rejected class at the selected classifier from consideration as the associated class for the input image.

22. The method of claim 21 further comprising iteratively repeating the following steps until only one output class remains:

defining a subset of classifiers associated with the candidate output class from the selected classifier;

selecting a new classifier having the best associated confidence value within the defined subset; and

eliminating the at least one rejected classes determined at the selected new classifier from consideration as the associated class for the input image.

23. The method of claim 22 further comprising accepting the one remaining output class as the associated output class for the input image, and providing the accepted output class to a vehicle occupant safety system.

24. The method of claim 21 further comprising extracting feature data from the input image and providing the extracted feature data to the plurality of classifiers.

25. The method of claim 24 wherein extracting feature data from the input image includes extracting at least one feature value from at least one region of interest within the image.

26. The method of claim 24 wherein the at least one feature value includes an average grayscale value associated with each region of interest.

27. The method of claim 24 wherein the at least one feature value includes a coarseness measure associated with each region of interest.

28. The method of claim 24 wherein the at least one feature value includes a contrast measure associated with each region of interest.